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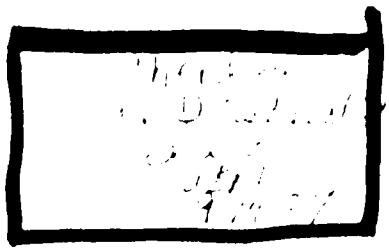

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SUPERFUND RECORDS

Final

Remedial Investigation-Phase I Work Plan

Cherokee County Site Kansas

September 14, 1984

CH2M HILL Project No. W67201.00

Engineers
Planners
Economists
Scientists

September 14, 1984

W67201.00

Ms. Alice Fuerst
EPA Region 7
324 East 11th Street
Kansas City, Missouri 64106

Dear Ms. Fuerst:

Please find enclosed eight copies of the Final Work Plan for Phase I Remedial Investigations at the Cherokee County Site, Kansas. A copy of the Optional Form 60 for CH2M HILL and SRW is enclosed showing the minor revisions for travel costs. The originals have been forwarded to Mr. Wayne Sellman, AZPM-Administration, in our Reston office for his signature. Please call if you have any questions.

A final work plan approval form is enclosed for Region VII approval. After you and the REM-RPO in Kansas City have signed, please send the original to Mr. Sellman. I need a copy for my project file in Denver. Thanks for your support in the timely review of the draft and your help in getting final approval.

Sincerely,

Dick Moos

Dick Moos
Site Project Manager

Enclosure

cc: Bob Davis/CH2M HILL, Denver
Diane Shoup/CH2M HILL, Reston

DE/CC/jrm011

CH2M HILL, Inc. Rocky Mountain Office CH2M HILL Boulder Engineering
P.O. Box 22508

Work Plan for Phase I
Remedial Investigation and Feasibility Study
for
Cherokee County Site, Kansas

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I. INTRODUCTION

A. Work Plan

This work plan was prepared by CH2M HILL to define the scope of activities anticipated to complete Phase I of the Remedial Investigation (RI) and Feasibility Study (FS) for the Cherokee County site, Kansas. At this time, the RI/FS is expected to be conducted in four phases, and the first phase is primarily collecting and evaluating the extensive literature and data base known to exist for this site.

This Remedial Investigation and Feasibility Study results from the Draft Remedial Action Master Plan (RAMP) dated October 5, 1983 and a subsequent Work Assignment issued by the U.S. Environmental Protection Agency (EPA) dated August 6, 1984. CH2M HILL will perform this work under contract to EPA; Contract No. 68-01-6692; CH2M HILL Project No. W67201.00, and EPA Work Assignment No. 127.7LB9.0.

B. Site Summary

The Cherokee County site is in a region known as the Tri-State Mining District, an area which encompasses about 500 square miles. The Tri-State Mining District includes portions of Cherokee County, Kansas; Ottawa County, Oklahoma; and Jasper County, Missouri. Figure 1-0 shows the Cherokee County site location.

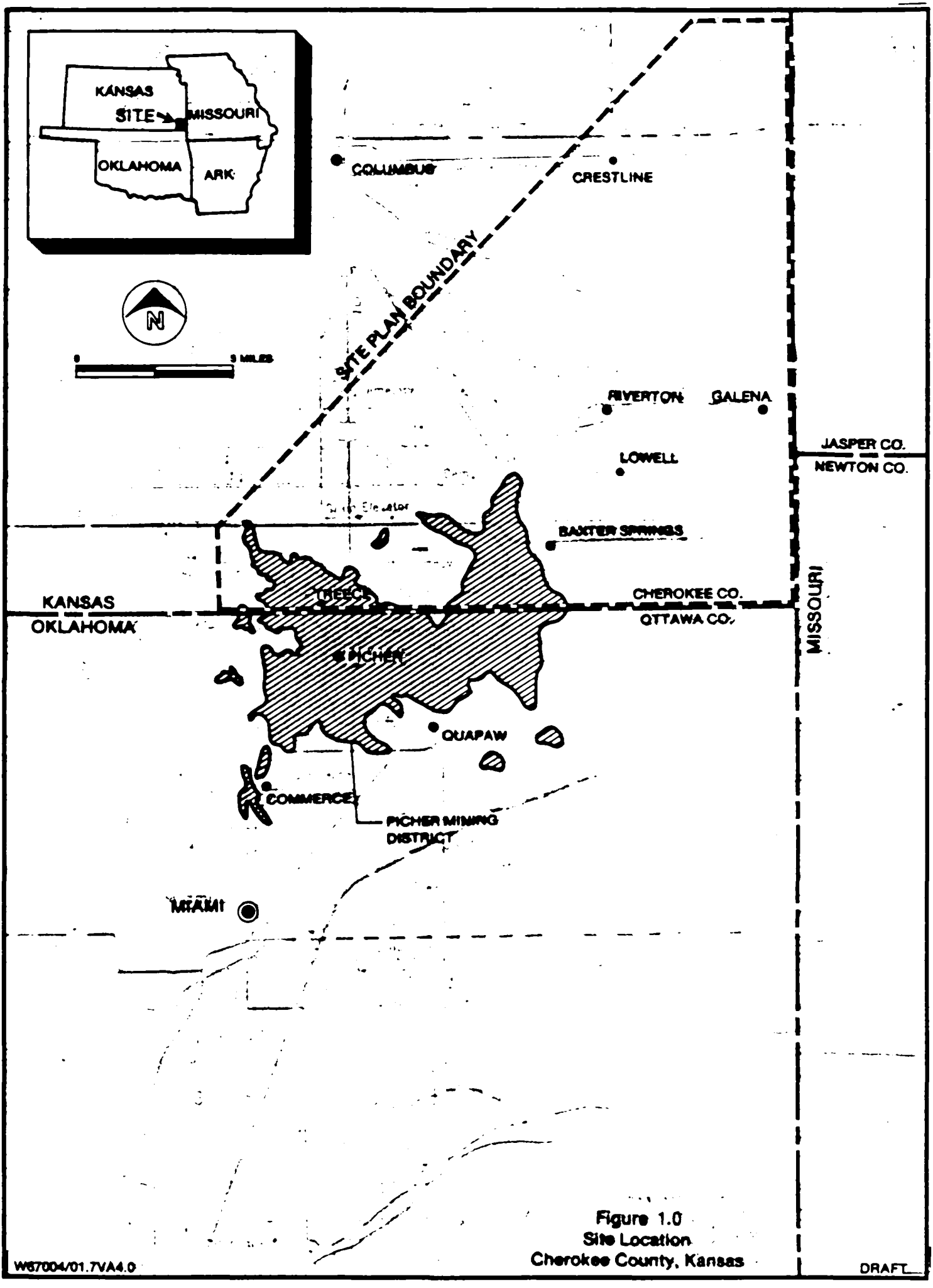

Figure 1.0
Site Location
Cherokee County, Kansas

DRAFT

The Tri-State District has been one of the most productive lead-zinc mining areas in the United States since 1904, having produced over 7 million tons of zinc and nearly 2 million tons of lead through 1964. Production continued until mid-1958, when all major mining operations were discontinued. Although mining on a small scale resumed in the early 1960's and some mining continued into the mid-1970's, the sites have since been abandoned.

The area is extensively honeycombed with underground mines. Water was continually pumped out of these mines during production. When mining activities ceased, and the pumping also ceased, the mines began filling with water through natural groundwater recharge and direct inflow of surface runoff via mine shafts, test holes, and subsidence areas.

Within the mining district, there are three principal hydrostratigraphic units, the Boone and Roubidoux Formations as aquifers and the Krebs Group as a confining layer. The Boone Formation outcrops at the surface throughout the project area and overlies the Krebs Group. The depth of the Roubidoux Formation is generally between 900 to 1,000 feet in the mining area. The potentiometric surface in the Boone Formation in the vicinity of the mines has risen steadily as the cone of depression filled after the mine pumping operations ceased. The result is that acidic mine water started flowing into surface watersheds in the District in late 1979.

Currently, the potentiometric surface in the Roubidoux is falling as more of this water is being used for municipal and industrial purposes. As increasing head differential drives water towards the Roubidoux, the potential of acid mine water pollution in this important aquifer increases.

The mining activities resulted in a significant generation of milling wastes or tailings which are stored in giant piles throughout the area. In the presence of water, oxidation of iron sulfides which are present in the tailing can produce an acid which will result in the solubilization of heavy metals. Runoff and/or seepage from the tailings may contain high concentrations of heavy metals which can degrade the water quality of receiving streams.

The water which filled the abandoned mines reacted with the oxidized sulfide products in the mines to form mineralized acid mine water. The acid mine water and tailing piles runoff have resulted in the deteriorated quality of the groundwater and surface waters in the area.

C. Purpose and Scope of Study

The purpose of this RI is to assess the nature and extent of environmental impacts caused by mining activities in a portion of the Tri-State Mining Area, and identify the subsequent problems associated with acid mine drainage, subsidence, and erosion of tailings piles. This work plan will specifically address a portion of Cherokee County, Kansas, and will assess how past mining activities in this area are currently impacting the

environment or posing a significant health hazard. Data obtained through a review of existing work and literature, along with a possible detailed field investigation, will aid in the design of remedial action alternatives for the site. A feasibility study will, through the use of these data, result in the determination of the most cost effective remedial action for this site.

The RI/FS for the Cherokee County site will probably be conducted in four phases consisting of Phase I, Existing Literature Search and Review, Agency Contacts, and Site Visit; Phase II, Initial Field Investigations; Phase III, Targeted Field Investigations; and Phase IV, the Feasibility Studies.

This work plan will address only Phase I of the remedial investigations. After the completion of this work, an assessment will be made of the existing available data and a detailed work plan for the initial field investigations (Phase II) will be developed, if required.

II. PHASE I WORK PLAN ACTIVITIES FOR REMEDIAL INVESTIGATION

During preparation of the RAMP for the Cherokee County site, a substantial amount of existing data and literature was identified, but only part of this information was obtained and reviewed because of the limited scope and budget of the RAMP process. It was also evident that more literature was likely available from many of the state and federal agencies, universities, or research organizations in the area as a result of past and recent studies within this large mining district. And finally, several ongoing studies were identified that have recently reported their results or have compiled data that was not obtained during the RAMP process. For example, the Remedial Investigation and Feasibility Study for the Tar Creek site (the southern extent of the Tri-State District) investigated under the direction of the EPA Region VI and the Tar Creek Task Force was recently completed; a Water Resources Report on the effect of lead and zinc mining on water resources of Cherokee County and adjacent areas was recently completed by the U.S. Geological Survey; and air quality monitoring is currently being conducted by the Kansas Department of Health and Environment.

The primary objective of the Phase I investigation is, therefore, to assemble the existing scientific literature and data, assess the extent and quality of the data, and determine how the Cherokee County site might be impacting the environment or posing a significant health hazard. The available data and scientific literature (published and unpublished) from prior and ongoing studies will be gathered, reviewed, and compiled into a data base for site characterization and development of work plans for further phases of the project.

The Phase I activities will include a site visit by key project staff members, agency contacts to acquire the literature and data available on the Tri-State Mining District, review and evaluation of that literature and data, and identification of data gaps, if any, that would require further field investigations before a feasibility study of remedial alternatives could be started. A Phase I Report is planned to discuss the existing data, recommend a more definitive boundary for the Cherokee County site, and identify data gaps that should be filled prior to initiating a Feasibility Study.

The description of the tasks required to accomplish the Phase I remedial investigation activities are presented below.

Task 1.0 Kickoff Meeting (Complete)

The kickoff meeting was held on August 27, 1984 in the Region VII EPA offices at Kansas City, Missouri. This meeting introduced CH2M HILL's Site Project Manager (SPM) Dr. Richard Moos, to the EPA Remedial Site Project Officer (RSPO), Ms. Alice Fuerst, and the Superfund Section Chief, Ms. Katie Biggs. The project objectives and approach were discussed and a scope of work for the Phase I study was developed. Target dates for conducting Phase I and starting Phase II were identified.

Task 2.0 Assemble Phase I Project Team

The remedial investigations and feasibility study at the Cherokee County site will be performed by project team personnel from CH2M HILL (CH2M) and SRW Associates, Inc. (SRW). SRW will take prime

responsibility for most of the RI and CH2M HILL will assist in the RI and conduct the FS.

Dr. Richard Moos of CH2M will act as the project manager, performing overall management activities for the project and coordinating the RI activities of SRW.

SRW will assist CH2M in Phase I activities and in the design and performance of the remedial investigation. SRW will be primarily responsible for the Phase I Report and execution of Phase II and III of the RI. The RI will include field investigations and preparation of the RI report.

Task 3.0 Health and Safety Plan

A site-specific health and safety plan will be prepared for the Phase I investigation site visit. The objective of the site health and safety assessment is to identify any onsite areas where exposure to potentially hazardous substances in the water, air, or soil may be a problem. Such information will be used for preparing adequate warnings and safeguards for the onsite staff visitors. The plan will include information to alert personnel to physical hazards likely to be encountered on the site. A health and safety plan will be prepared to reflect unanticipated changes in the hazards or current conditions encountered at the project site. The plan will be consistent with the work to be performed and will comply with the Occupational Health and Safety Administration codes, the EPA Occupational Health and Safety Manual, Section III(c) (6) of CERCLA, the EPA Interim Standard Operating Safety Procedures and other EPA guidance, Kansas codes, and Site conditions.

Task 4.0 Site Visit

A reconnaissance visit to the site will be conducted to become familiar with site conditions and determine the potential extent of the study area. The initial site visit will be conducted by team members from CH2M HILL and from SRW to gather firsthand information on site features, access routes, potential site boundaries, the variety of problems within the site, and site safety requirements. The team members will also meet with appropriate local agencies to establish contacts and to gather existing information on the project area.

It is assumed that EPA will contact landowners or mining companies to obtain permission to access various sites. CH2M will coordinate with EPA to generate a list of "areas of interest" and "areas to be visited" to allow contact of the landowners.

Prior to the site visit Region VII EPA or CH2M HILL (with EPA approval) will contact local agencies to pre-arrange meetings to be conducted during the site visit. We assume EPA will arrange to have an individual familiar with the site accompany the project team during the site visit.

Task 5.0 Agency Contacts and Literature Collection

The objective of this task is to collect pertinent existing data and information on the Tri-State Mining District and the Cherokee County site. Additional information from surrounding areas may also be collected during this task if deemed necessary.

A list of the anticipated agencies to be contacted during this phase of the investigation is shown on Table 1.

Table 1
PLANNED AGENCY CONTACTS
REMEDIAL INVESTIGATIONS, CHEROKEE COUNTY SITE, KANSAS

Agency	Location	Individual	Principal Literature/Data
Kansas Department of Health & Environment	Topeka	John Irwin Karl Birns Mike Butler Joe Hollowell Larry Knouche	Air quality Water quality and quantity Solid and hazardous wastes Mining and mine reclamation
Kansas Fish and Game Commission	Pratt	Fisheries Division Game Division Land Development and Management	Fisheries, wildlife, vegetation
Kansas Geological Survey	Lawrence	Minerals Resources Section Jim McCauley Geohydrology Section Geochemistry Section	Geologic data, subsidence, tailings deposits, water resources, mining
Kansas Biological Survey	Lawrence	Ronald McGregor	Fisheries, wildlife, vegetation
Cherokee County	Galena Columbus	County Commissioners County Health Department Maurice Lamb	Local regulations Health and water quality data
University of Kansas Medical School	Kansas City	Dr. John Neuberger	Air quality, cancer rates in Cherokee County
Oklahoma Department of Wildlife Conservation	Oklahoma City	Fisheries Division Harold Namminga Game Division Environmental Services	Fish, wildlife, and vegetation
Oklahoma Geological Survey	Norman	Charles Mankin, Director	Mining, geology, minerals, and mine reclamation
Oklahoma Department of Health	Oklahoma City	Bureau of Water Quality Bureau of Waste Management Water Resources Board Ron Jarman Main Hutchinson Vahan Hoonanian	Air quality, water quality, Tar Creek Task Force reports, waste disposal
U.S. Geological Survey	Oklahoma City	David Parker Tim Spruill	Mining, geology, mine reclamation
U.S. Geological Survey	Rolla	Jim Barks	Water quality, water resources
Missouri Department of Conservation	Jefferson City	Fisheries Division Wildlife Division Forestry Division	Fish, wildlife, vegetation

Missouri Department of Natural Resources	Jefferson City	Division of Environmental Quality Air Pollution Control Program Water Pollution Control Program Water Resources Planning	Air quality, water quality, water resources, and solid and hazardous wastes
Missouri Department of Natural Resources	Rolla	Division of Geology and Land Survey Mike McFarland	
University of Missouri	Rolla	University of Missouri	
U.S. EPA, Region VI	Dallas	Stan Hitt Tar Creek Task Force [illegible]	Tar Creek RI/FS data, water quality
U.S. EPA, Region VII	Kansas City	Alice Fuerst Wolfgang Brandner	
U.S. Department of Agriculture Soil Conservation Service	Chanute	[illegible]	Soil, vegetation, water quality data
USDA Cherokee County Office	Columbus	Pat Broyles	Soil, vegetation, water quality data
Cherokee County Conservation District	Columbus	Keith Kelle[illegible]	Agricultural practices
U.S. Bureau of Mines	Rolla	[illegible]	[illegible] studies

This table represents principle contacts known at this point and time; additional contacts may be made if appropriate.

[illegible]

CH2M HILL will cooperate with the EPA Region VII to develop the first contact with these agencies. Additional agencies or individuals not listed in Table 1.0 may be contacted if initial contacts indicate they may have important resources. The officials will be contacted by telephone and/or letter requesting information applicable to the Cherokee County site and advising them of the direct agency contacts being made. The potential information to be requested will include: reports of previous field investigations, mine plans and mining activity records, analytical test results, boring log data (USGS and mining companies), geological and hydrogeological data and maps, aerial and site photographs, topographic survey data, local water supply information, locations of mines and tailings piles, locations of mine test borings and groundwater wells, surface water quality and flow data, and soil classification data.

A standard Data/Report Summary form will be completed summarizing each major technical report, aerial photo, map, and analytical data set applicable to the project area. This form will identify the source of data, date, title, and author, summary of the report of data set, form of information (i.e., photographs, publication, microfilms, etc.), and the site area covered. A standard agency contact/interview form will also be completed to document each direct contact made during this activity, and summarize the information obtained while interviewing agency staff members with first-hand knowledge of the mining district. Copies of these completed agency contact and data/report summary forms will be made available to project staff to keep key staff members aware of the recent contacts and data acquisitions and avoid duplication of effort. The forms will also

be used to compile the bibliography and as a resource during the report writing task.

For budgetary purposes it is assumed that three members of the project staff will travel to the Tri-State Mining District area and appropriate agency offices in Kansas, Oklahoma, and Missouri to search files, interview individuals, and collect applicable data and reports.

A bibliography of existing information applicable to the project site will be prepared and submitted as part of the Phase I Report.

Task 6.0 Existing Literature Review and Evaluation

The objective of this task is to review the information that was collected during Task 5.0 and evaluate its accuracy and usefulness. It is possible, although unlikely, that the existing literature and data files will contain sufficient usable data so that only limited field studies will be required, or the project can proceed directly to the FS. A principal activity during this task, therefore, will be to assess the existing data and identify the data/information gaps that will have to be filled prior to a FS. The existing literature will be used to describe the geology, hydrology, geohydrology, air quality, and ecological systems of the site, and will also provide the data base for developing any field investigation that might be required.

This task will form the data base for determining the proper site boundary.

Task 7.0 Site Boundary Conditions

At the present time it is very difficult to define the proper geographical extent of the Cherokee County site. The information obtained during Tasks 4, 5, and 6 will be used to identify appropriate site boundaries, and present recommendations to EPA Region VII concerning the most appropriate site boundaries. The boundaries will be set so that subsequent investigations will address the site problems in sufficient detail to develop acceptable remedial action alternatives and complete the feasibility study.

Task 8.0 Prepare Phase I Report

A Phase I Report will be prepared summarizing the data base and results of the Phase I remedial investigations. The draft report will be submitted to Region VII EPA for review and comment. Following receipt of EPA's comments, a Final Phase I Report will be prepared.

The principal objective of the Phase I study and report is to determine if additional remedial investigations will be required before a feasibility study can be conducted. Also, if more field work is required, the Phase I study will identify the major data gaps that should be filled by the additional field studies.

To meet the above objectives, the report will include a summary of the existing data and literature on the site, and an assessment of the completeness and quality of the data. The report will be formatted to present a summary and assessment of the existing data on each of the major physical and biological features of the site (for example, geohydrology, surface water quality and quantity, aquatic ecology, air quality, etc.).

A project review/analysis meeting with the EPA has been budgeted into this task to discuss the findings of the Phase I investigations and review the comments submitted by the EPA on the draft report.

Task 9.0 Management Activities

Project management activities play a key role in conducting an efficient and effective remedial investigation. The responsibilities of project management include conducting project orientation meetings, establishing project planning and control systems, reviewing and approving of work plans, coordinating data collection and report preparation activities, reviewing actual versus planned costs and schedules, and administering contracts and subcontracts.

Throughout the course of the Phase I RI, the following monitoring, control, and review activities will occur:

- Continuous review of financial and technical progress
- Monthly cost and technical performance reports
- Health and safety-related operational planning and auditing
- Maintenance of documentation and document control
- Coordination of specific technical activities with EPA, major subcontractors, and other cognizant agencies

- Administration of contracts and subcontracts
- Maintenance of quality control and quality assurance activities
- Conduct project review meetings with the EPA

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III. ESTIMATED PROJECT SCHEDULE AND COSTS

A. Project Schedule

The anticipated schedule to perform the Phase I remedial investigation is shown in Figure 2.0. This schedule is developed with the best estimates of time required for each major task. The schedule assumes that the proper agency and individual contacts can be made between September 24 and October 15, and 2 weeks are required to complete the report after the last contacts have been made.

B. Project Costs

The estimated costs for performance of the Phase I remedial investigation are given in Table 2-0. Actual project developments or constraints may cause the cost estimates to change, but the SPM will notify EPA Region VII if such conditions arise. For example, if the available literature and data are much more extensive than anticipated the SPM and RSPO will discuss the alternatives possible for completing Phase I and assess the impacts on cost and schedule, then the SPM will follow EPA's directive.

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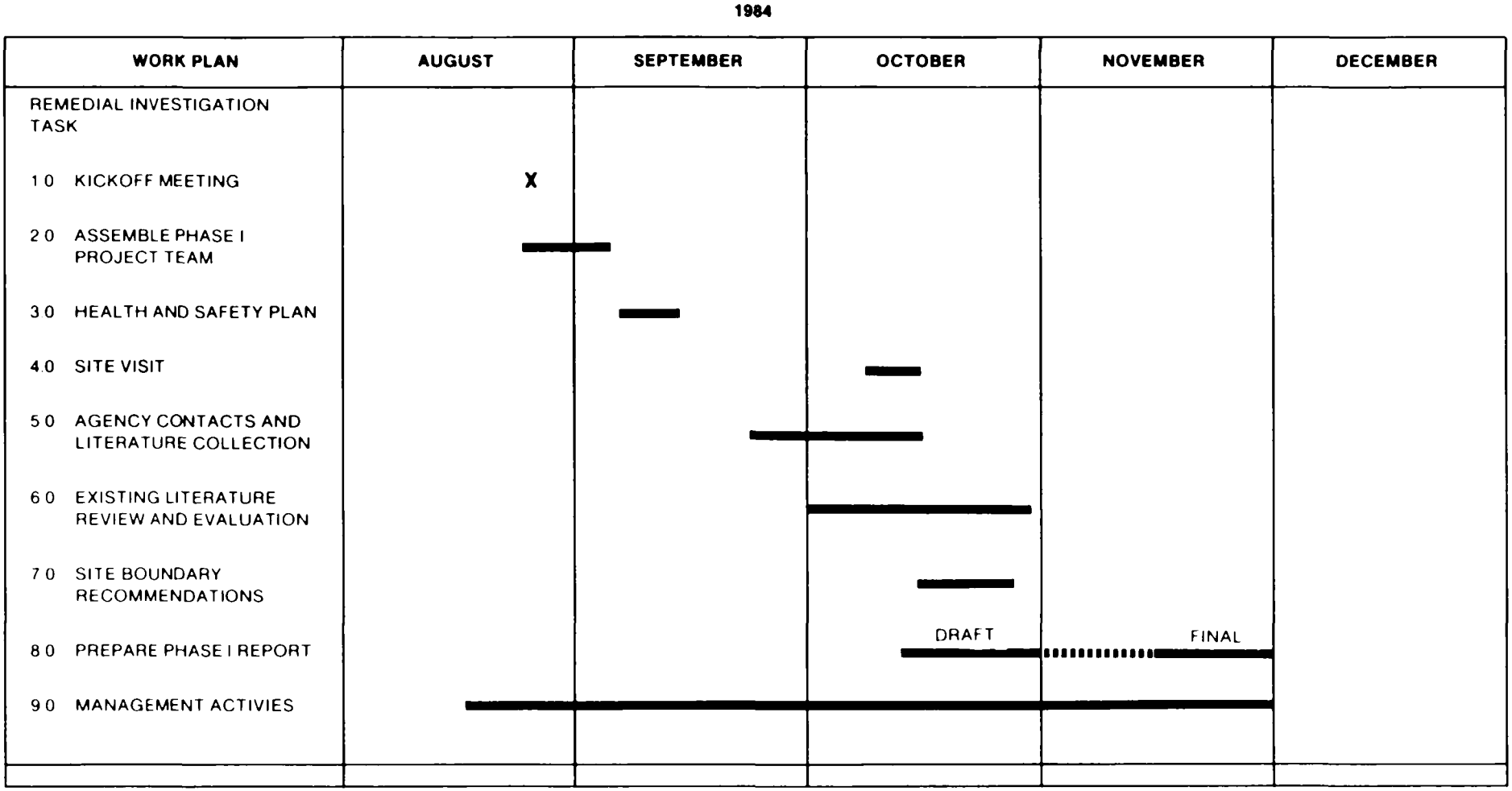

Figure 2.0
Schedule
Cherokee County Site
Phase I Remedial Investigation